12 " Experiments on Light." By Henry Fox Talbot, Esq., M.P., F.R.S.

In the first section of this paper, an account is given of certain appearances presented by transparent objects, and especially saline crystals, viewed through a microscope, when illuminated by polarized light. For this purpose, the first polarizing medium, consisting of the arrangement of single-image calcareous spar, invented by Mr. Nichol, is fixed beneath the stage of the microscope ; and the second, which is similar to it, is interposed between the eye-glass and the eye, and is capable of being turned on its axis, so as either to allow of the transmission of the whole of the light polarized by the first medium, or to intercept the whole of it, according as its position is similar, or at right angles to the former. In the latter case, any substance which has the property of depolarizing the light transmitted to it by the first medium, will appear luminous, while the rest of the field of view is quite dark, and will exhibit the most brilliant colours, dependent on its thickness and position ; so that if the stage of the microscope be turned round, the colour of each crystal is seen to change, and gradually to assume the complementary tint. Other variations in the appearances are produced by interposing a plate of mica, which gives a general tint to the whole field of view, and modifies the colours of the objects viewed ; and also by turning the polarizing eye-piece, so that the whole of the polarized light is transmitted ; when crystals, which would be white if viewed by ordinary light, may be made to assume various colours, and even sometimes to appear perfectly opaque ; a result which does not seem to be in accordance with that which theory would lead us to expect.

The second section is occupied with the development of a principle which the author conceives is extensively applicable to the purposes of photometry, or the accurate measurement of the intensity of light. It is founded on the well-known experiment of the appearance of a uniform grey tint presented by a circle, partly white and partly black, when made to revolve rapidly ; the intensity of the light being regulated by the proportional spaces occupied by each colour. Several variations of this experiment are described, with a view to its practical application to the proposed object. The author also suggests the employment of methods founded on a similar principle to the measurement of quantities in various other branches of physical science ; for example, that of high temperatures.

13. " On the Mummy Cloth of Egypt ; with Observations on the Manufactures of the Ancients." By James Thomson, Esq., F.R.S. Communicated by Dr. Roget, Sec. R.S.

By subjecting the threads of various specimens of cloth, enveloping Egyptian mummies, to accurate microscopic examination, which was done at the request of the author by Mr. Bauer, it was ascertained that they were formed exclusively of the fibres of linen, and not of cotton, as had been supposed ; a conclusion which is corroborated by other considerations stated by the author. The paper is accompanied by drawings, exhibiting the appearances of the threads both of cotton

and of linen, when highly magnified; and concludes with an historical disquisition on the cloth manufactures of the ancients, and the mention of experiments from which it is inferred that the principal colouring materials employed in dyeing the yarn were indigo and saffron.

14. "An Account of some Experiments to measure the Velocity of Electricity, and the Duration of Electric Light." By Charles Wheatstone, Esq., Professor of Experimental Philosophy in King's College, London. Communicated by Michael Faraday, Esq., F.R.S.

The continuance for a certain time of all luminous impressions on the retina prevents our accurately perceiving, by direct observation, the duration of the light which occasions these impressions, but by giving the luminous body a rapid motion, which produces the appearance of a continued train of light along the path it has described, its condition at each moment may be ascertained, and consequently its duration determined. The same law of our sensations precludes us from direct perception of the velocity with which the luminous cause is moving, as the whole of its track, for a certain distance, appears to be equally illuminated; but by combining a rapid transverse motion of the body from which the light proceeds, with that which it had before, its path may be lengthened to any assignable extent, and both its direction and its velocity will admit of measurement. The author gives various illustrations of this principle, and of his attempts to apply it to appreciate the duration and the velocity of the electric spark. His first experiments were made by revolving rapidly the electric apparatus giving electric sparks; but in every instance they appeared to be perfectly instantaneous. He next resorted to the more convenient plan of viewing the image of the spark reflected from a plane mirror, which, by means of a train of wheels, was kept in rapid rotation on a horizontal axis. The number of revolutions performed by the mirror was ascertained, by means of the sound of a siren connected with it, and still more successfully by that of an arm striking against a card, to be 800 in a second. The angular motion of the image being twice as great as that of the mirror, it was easy to compute the interval of time occupied by the light during its appearance in two successive points of its apparent path, when thus viewed; and it was ascertained that the image passed over half a degree (an angle which, being equal to about an inch, seen at a distance of ten feet, is easily detected by the eye,) in the 1,152,000th part of a second. The result of these experiments, as regarded the duration of the spark, was that it did not occupy even this minute portion of time; but when the electric discharge of a battery was made to pass through a copper wire of half a mile in length, interrupted both in the middle, and also at its two extremities, so as to present three sparks, they each gave a spectrum considerably elongated, and indicating a duration of the spark of the 24,000th part of a second. The sparks at both extremities of the circuit were perfectly simultaneous, both in their period of commencement and termination; but that which took place in the middle of the circuit, though of equal duration with the former, occurred later, by at least the millionth part